

# Chest Trauma Management

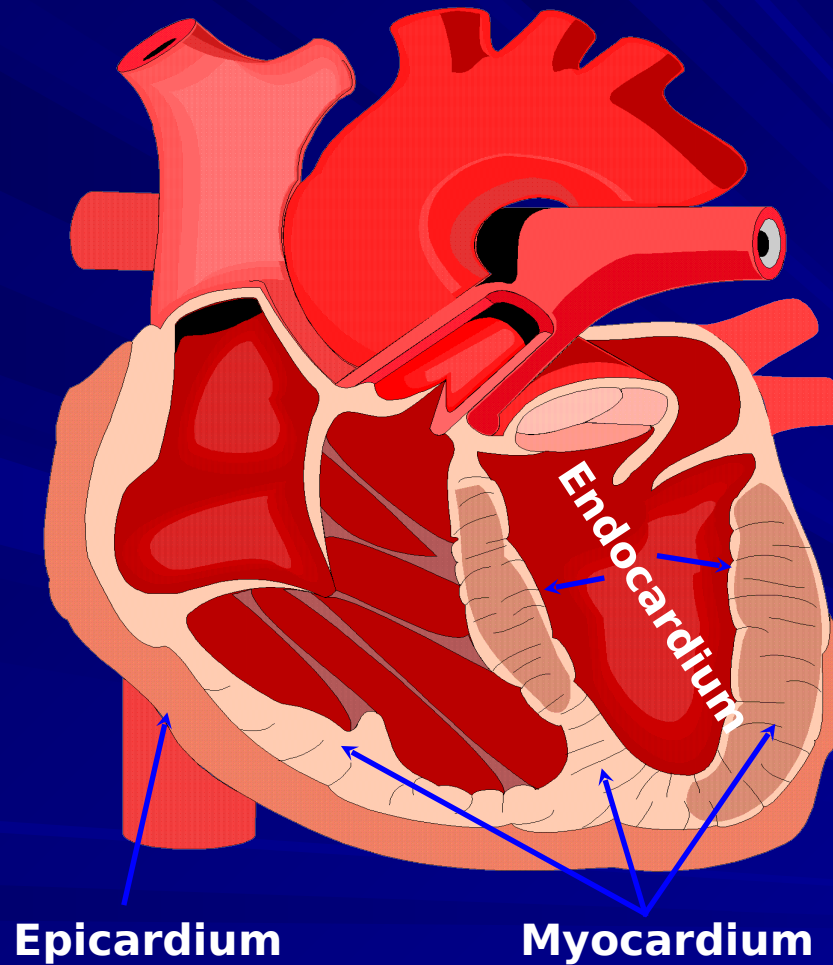


# General

- Chest injuries may result from:
  - Gunshot wounds (GSW)
  - Shrapnel
  - Explosions
  - Motor vehicle crashes (MVC)
  - Falls
  - Crush injuries
  - Stab wounds

# Organs of the Thorax

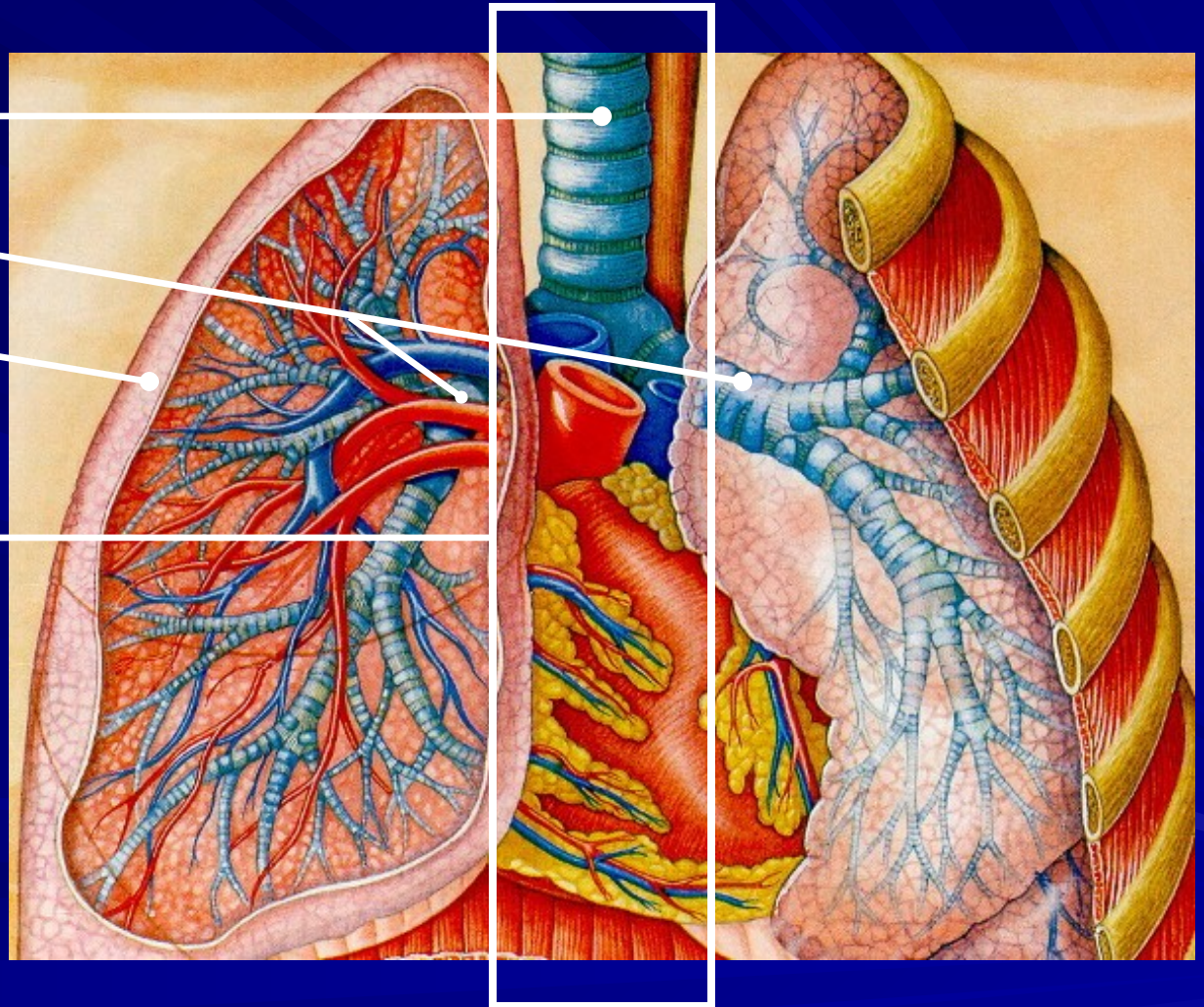
- Heart



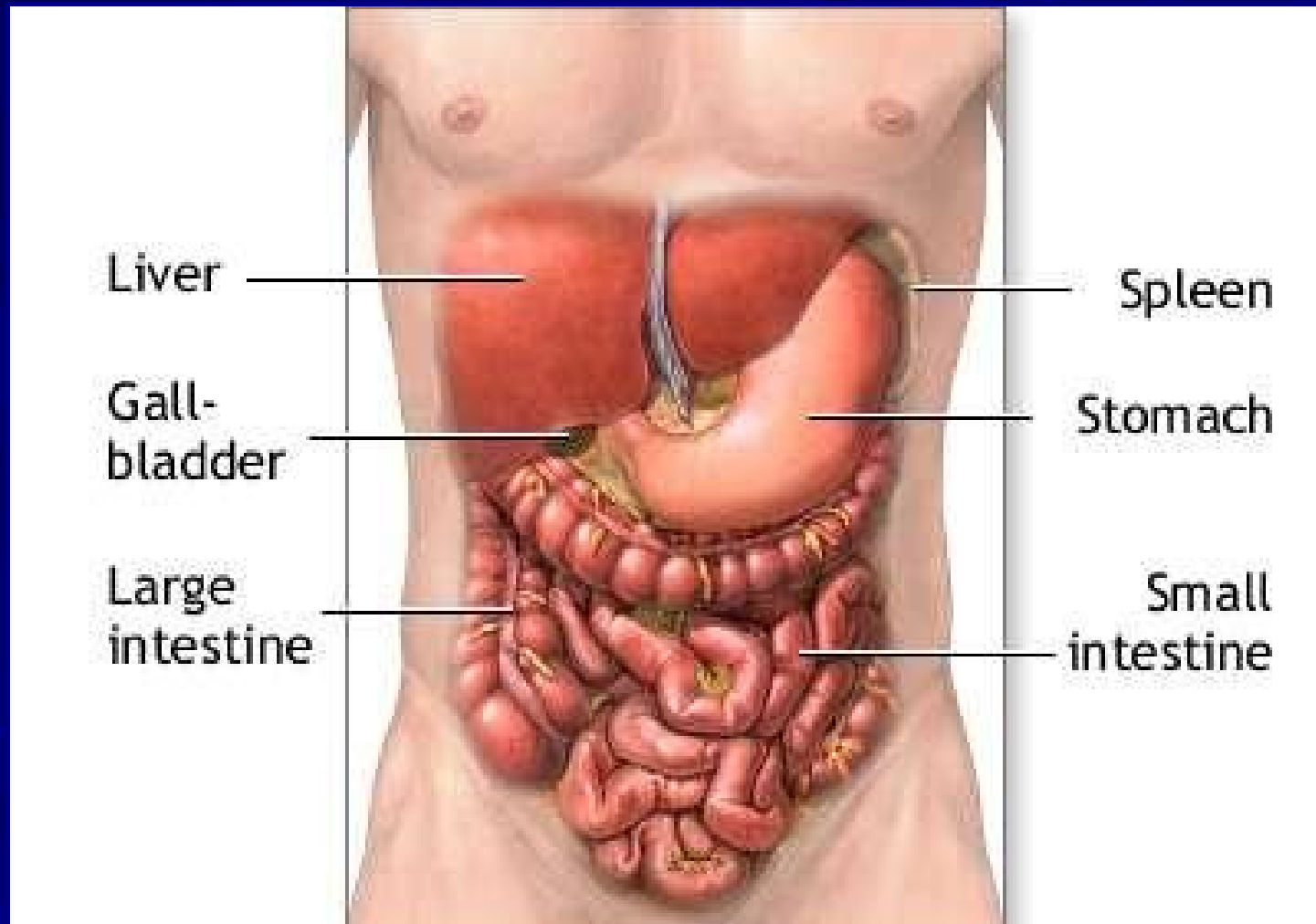


# Organs of the Thorax

- Trachea
- Bronchi
- Lungs
- Mediastinum



# Organs of the Abdomen



# Organs of the Abdomen

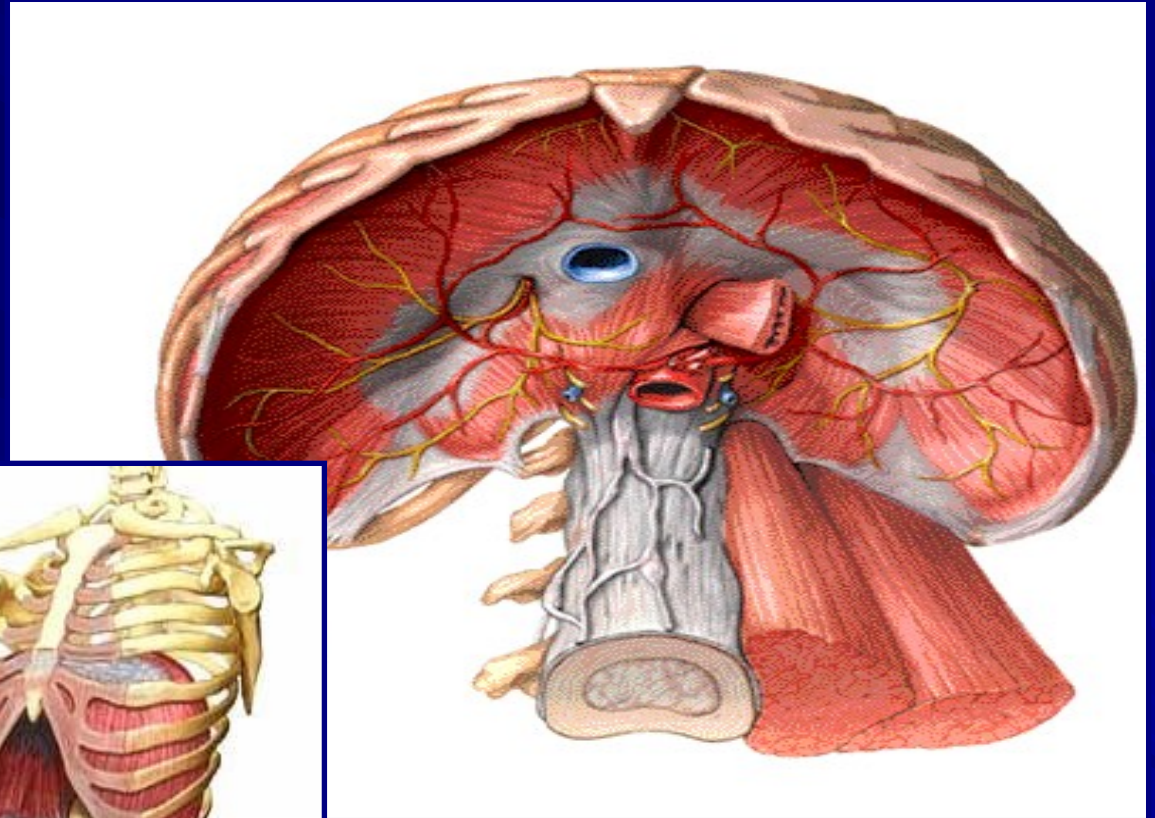
- Muscles





# Organs of the Abdomen

- Diaphragm



# Determine the MOI

- Penetrating trauma.
  - GSW or stab wounds
  - Concentrates forces over smaller area
  - Bullet trajectories unpredictable
- Blunt trauma.
  - Force distributed over larger area
  - Visceral injuries occur from:
    - Deceleration
    - Compression
    - Sheering forces
    - Bursting



# Assess the Casualty

- Identify signs and symptoms:
  - Assess mental status (AVPU)
  - Assess the airway
  - Assess the breathing
  - Assess the circulation

# Signs Indicative of Chest Injury

- Shock.
- Cyanosis.
- Hemoptysis.
- Chest wall contusion.
- Flail chest.
- Open wounds.
- Jugular vein distention (JVD).
- Tracheal deviation.

# Assess Respirations

- Respiratory rate and effort:
  - Tachypnea
  - Bradypnea
  - Labored
  - Retractions
  - Progressive respiratory distress

# Assess the Neck

- Position of trachea.
- Subcutaneous emphysema.
- JVD.





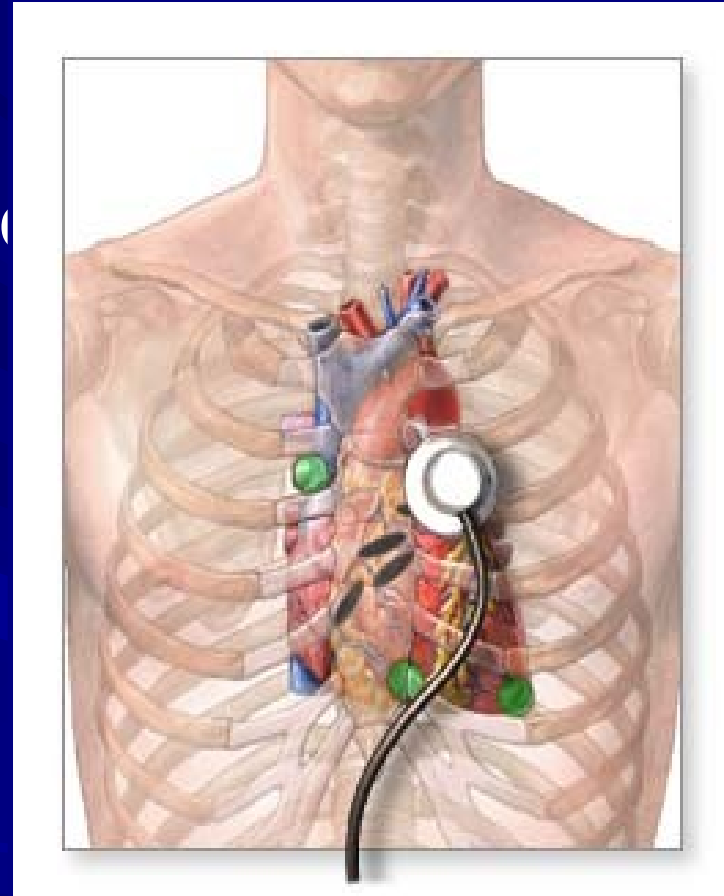
# Assess the Chest Wall

- Contusions.
- Tenderness.
- Asymmetry.
- Open wounds or impaled objects.
- Crepitation.
- Paradoxical movement



# Assess the Chest Wall

- Lung sounds:
  - Absent or decreased
    - Unilateral
    - Bilateral
  - Location
  - Bowel sounds in chest?



# Assess the Chest Wall

- Lung sounds – Percussion.
  - Hyperresonance
    - Pneumothorax
    - Tension pneumothorax
  - Hyporesonance (hemothorax)

# Assess the Chest Wall



- Compare both sides of the chest at the same time when assessing for asymmetry.

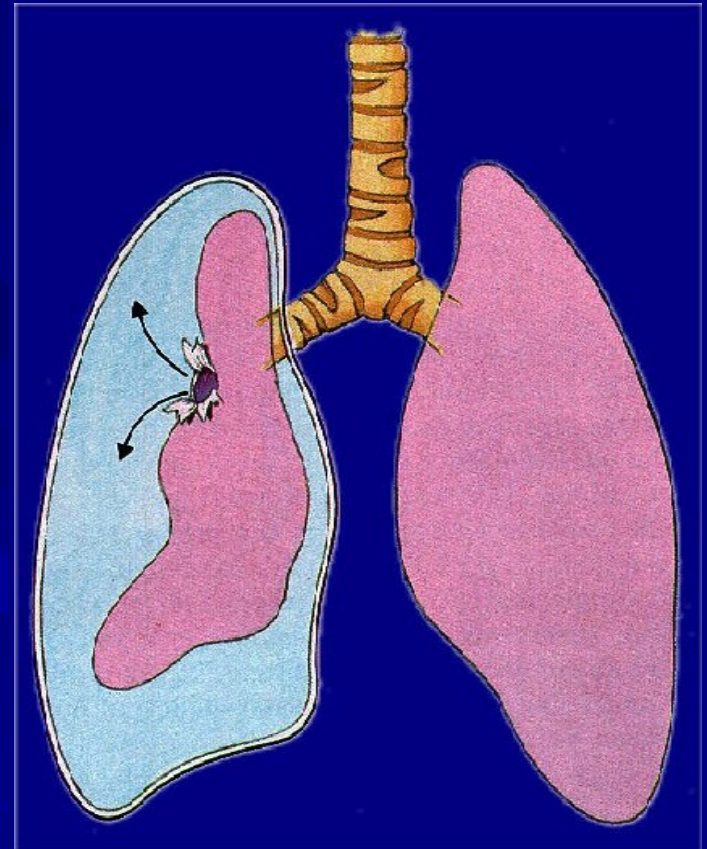


# Chest Physiology

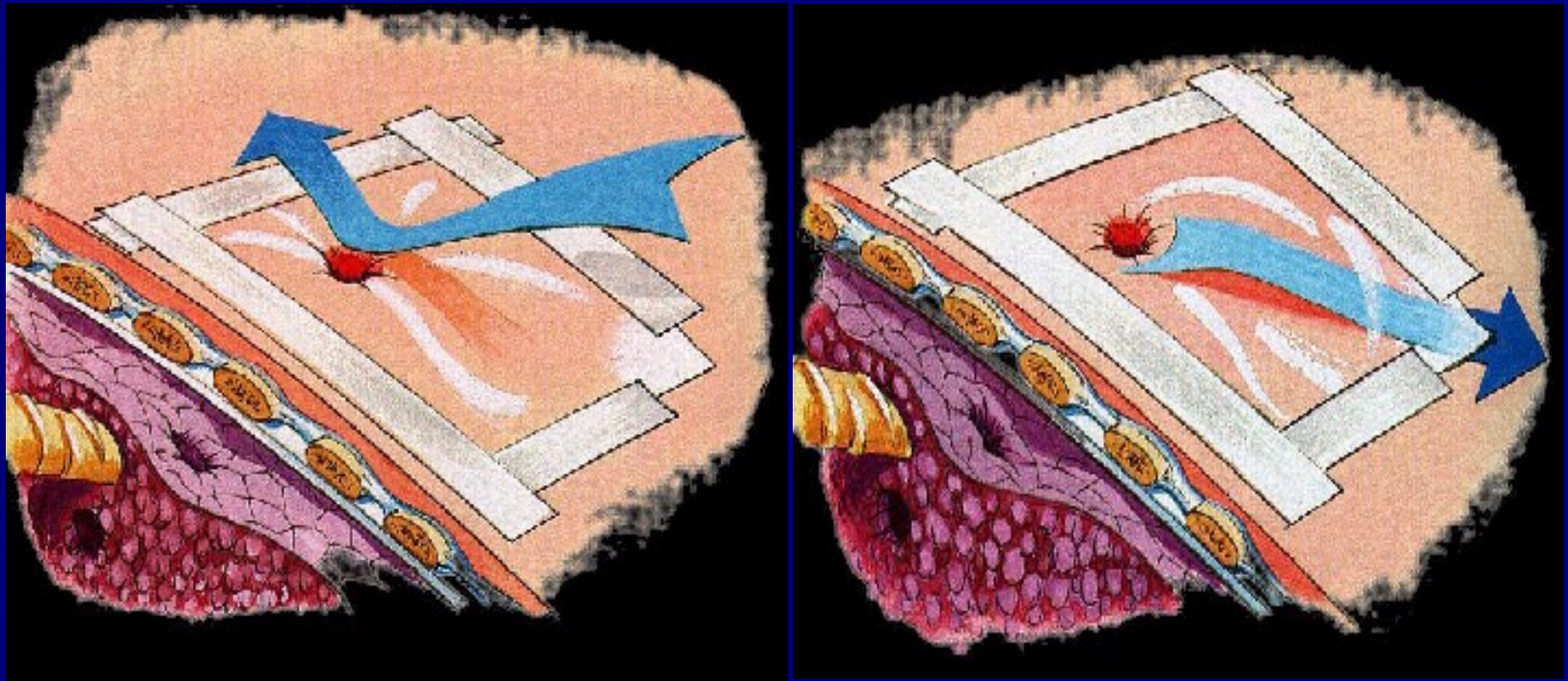
- Chest normally has negative pressure.
- Penetrating wound creates a positive pressure in chest cavity.
- Air will enter the easiest route. If a hole in the chest is smaller than  $\frac{2}{3}$  the size of the trachea, air will enter through the trachea preferentially and not through the hole in the chest.

# Open Pneumothorax

- Caused by penetrating thoracic injury.
- May present as a “sucking chest wound” if  $> 2/3$  diameter of the trachea.



# Open Pneumothorax





# Open Pneumothorax

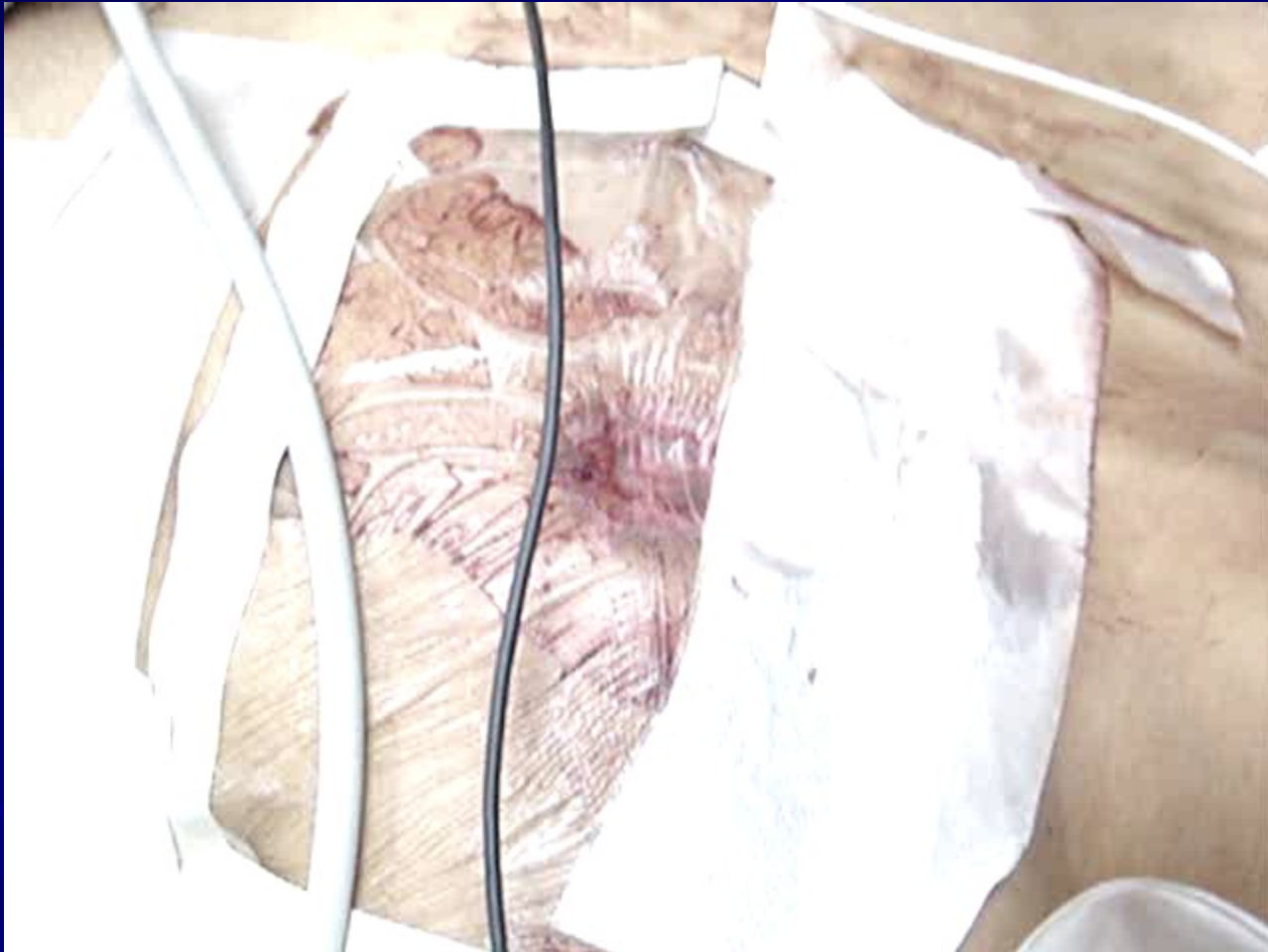


Click on picture for video

CMAST



# Open Pneumothorax



Click on picture for video

CMAS

# Open Pneumothorax

- Management:
  - Ensure an open airway
  - Close the chest wall defect, both entrance and exit with an occlusive dressing, petrolatum gauze or Asherman Chest Seal®
  - Place the casualty in the sitting position
  - Monitor respirations after an occlusive dressing is applied

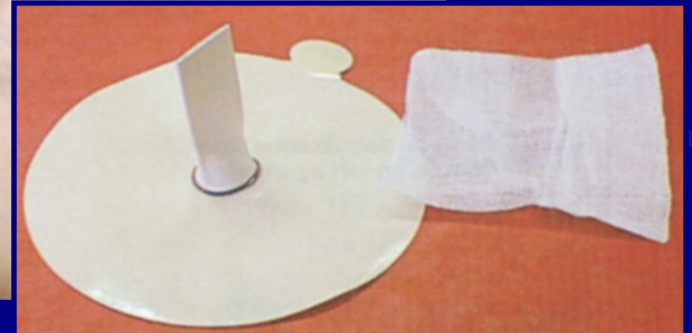
# Open Pneumothorax

- Petroleum Gauze can also be used to seal a sucking chest wound.





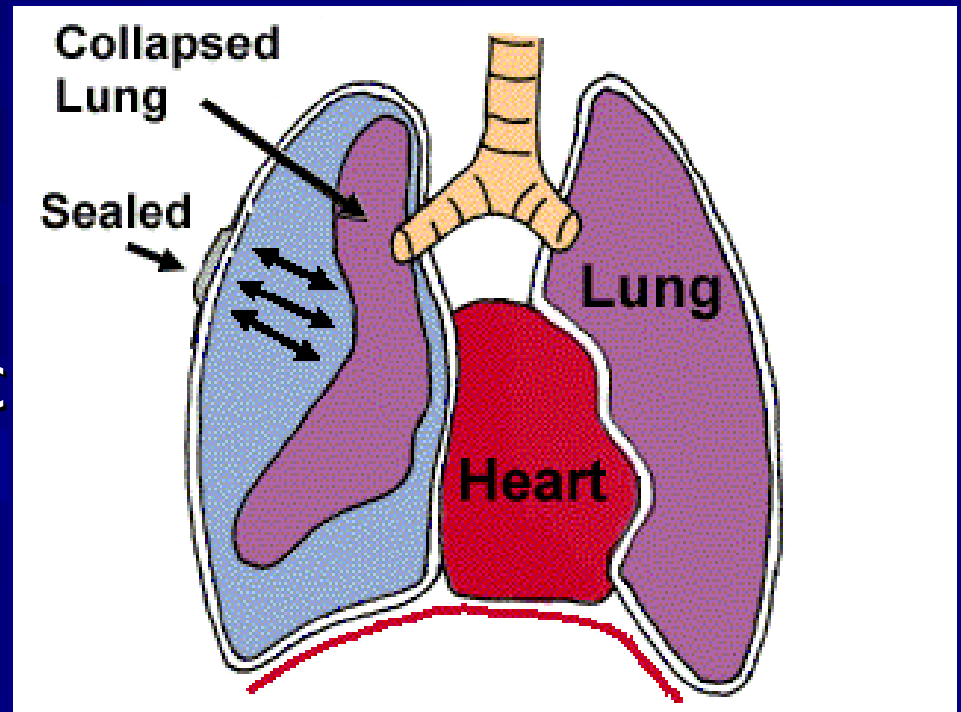
# "Asherman Chest Seal®"





# Tension Pneumothorax

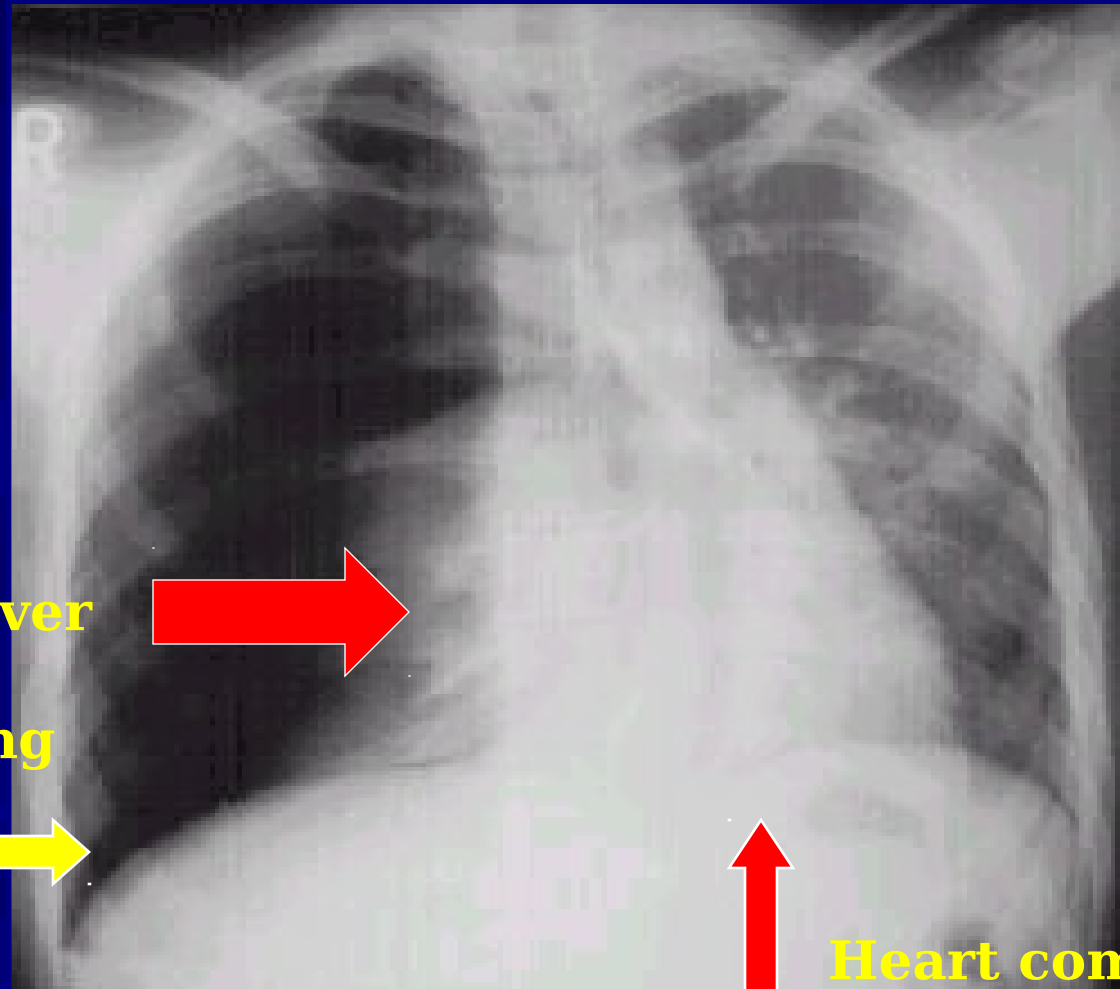
- One-way valve created from penetrating trauma.
- Air enters thoracic space but cannot escape.
- Pressure builds:



# Tension Pneumothorax

- If after sealing the open pneumothorax, the casualty develops progressive difficulty breathing, consider this a tension pneumothorax and perform a needle chest decompression.
- If no capability of NCD exists and the casualty continues to have progressive respiratory distress, remove the occlusive dressing and stick a gloved finger into the open wound and attempt to “burp” the wound.

# Tension Pneumothorax



**Air pushes over  
heart and  
collapses lung**

**Air  
outside  
lung  
from  
wound**

**Heart compressed  
not able to pump  
well**

CMAS

# Tension Pneumothorax

- Clinical presentation:
  - Anxiety, agitation, apprehension
  - Diminished or absent breath sounds
  - Increasing dyspnea with cyanosis
  - Tachypnea
  - Hyperresonance to percussion on affected side
  - Hypotension, cold clammy skin
  - Casualty begins to deteriorate rapidly

# Tension Pneumothorax

- Clinical presentation (cont'd):
  - JVD and cyanosis
  - Decreased lung compliance (intubated)
  - Tracheal deviation (*late*)
- \* These signs are hard to detect in a combat environment.

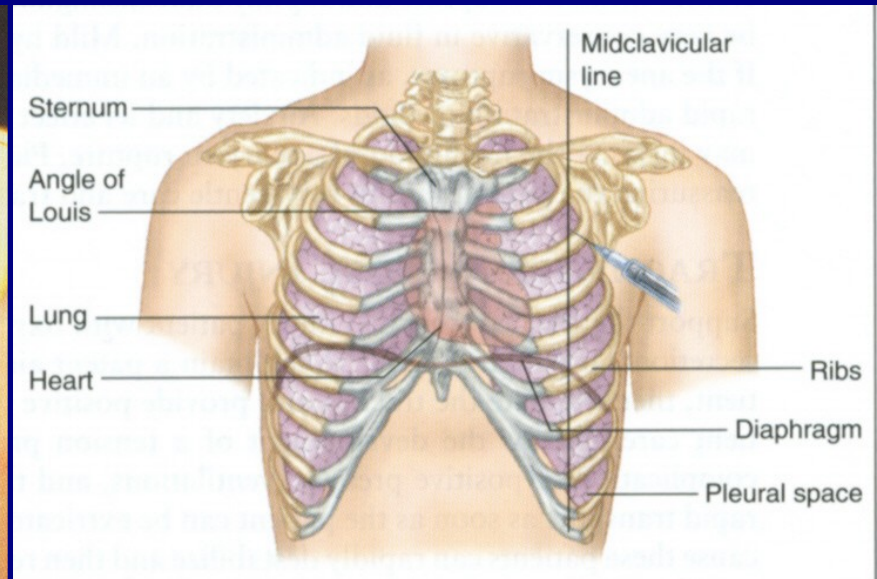


# Tension Pneumothorax

- Management:
  - Ensure an open airway
  - Decompress the affected side
- Indications:
  - Penetrating chest wound with progressive respiratory distress

# Needle Chest Decompression

- Procedure:
  - Identify the second ICS on the anterior chest wall, MCL:



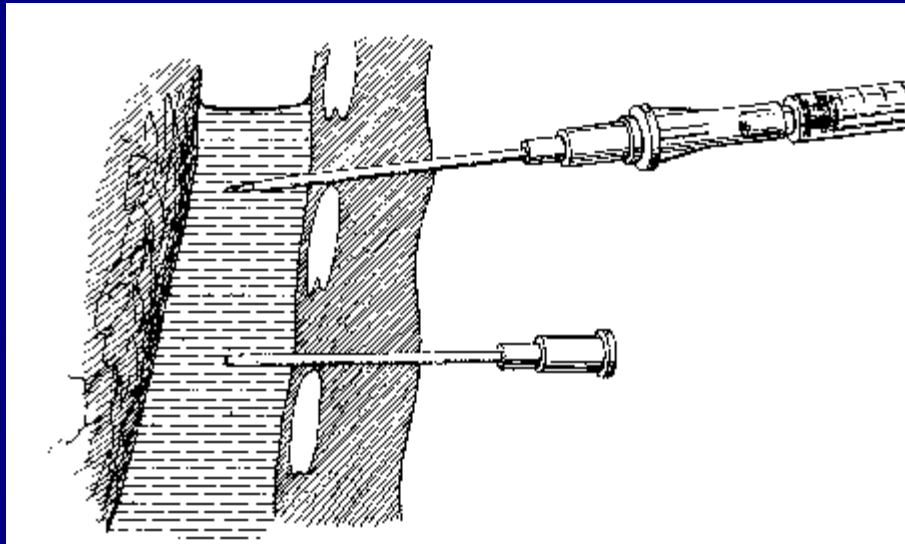
# Needle Chest Decompression

- Prep the area with an antimicrobial agent.
- Insert a 14 ga. Catheter at a 90° angle over the the 3<sup>rd</sup> rib, into the pleural space at the
- Needle should be long enough to enter the chest cavity (2½ – 3 inches)



# Needle Chest Decompression

- If a tension pneumothorax is present, a “hiss of air” may be heard escaping from the chest cavity.
- Remove the needle, leave the catheter in place.





# Needle Chest Decompression

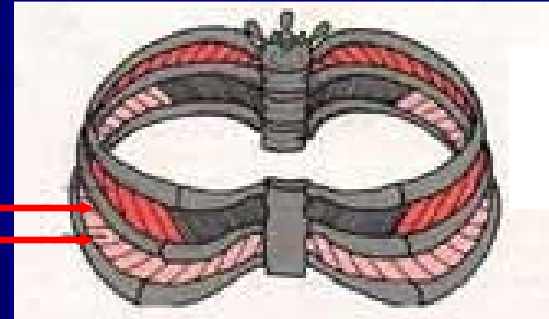
- Tape the catheter hub to the chest wall.
- The casualty's condition should rapidly improve.
- Evacuate ASAP.



# Needle Chest Decompression

- Questions:

- Over top or bottom of rib? Why?



- What if casualty doesn't have a tension pneumothorax and you perform NCD?
    - Already has hole(s) in chest
    - Probably larger than diameter of 14 ga. needle
    - No additional damage

# Needle Chest Decompression

- Questions:
  - Will lung re-inflate after pressure is released from chest cavity?
  - No; to re-inflate the lung you must have a chest tube with suction and or positive pressure ventilation.

# Needle Chest Decompression

- Questions:
  - So if the NCD does not re-inflate the lung what does it do?
  - We are simply converting a tension pneumothorax to a standard pneumothorax; this is much more survivable than a tension pneumothorax.



# Needle Chest Decompression

- Complications:
  - Insertion of the needle over the top of the rib prevents laceration of the intercostal vessels or nerve which can cause hemorrhage or nerve damage.

# Summary

- Injuries to the chest are fewer in nature secondary to modern body armor; however, it doesn't protect 100%.
- Penetrating wounds to the chest can be rapidly fatal if not identified early and treated appropriately.

# Questions?

